

APRIL/MAY 2025

**23PMB32 — MOLECULAR BIOLOGY AND
RECOMBINANT DNA TECHNOLOGY**

Time : Three hours

Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define semi-conservative replication.
2. What is the role of DNA polymerases in replication?
3. What is gene regulation?
4. What is a silent mutation?
5. State the purpose of the Ames test.
6. Define vector.
7. What is PCR?
8. Explain the term 'restriction mapping'.
9. What is gene therapy?
10. What are monoclonal antibodies?



SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions.

11. (a) Explain the mechanism of semi-conservative replication of DNA.

Or

- (b) Describe the structure and processing of m-RNA.

12. (a) Discuss the Lac operon mechanism of gene regulation in prokaryotes.

Or

- (b) Explain the nucleotide excision repair mechanism.

13. (a) What are restriction endonucleases? Discuss their classification.

Or

- (b) Describe the process of artificial gene transfer using microinjection.

14. (a) What is Polymerase Chain Reaction (PCR)? Explain its principle.

Or

- (b) Describe the construction of a cDNA library.

15. (a) What are the applications of animal cell culture in biotechnology?

Or

- (b) Explain the concept of transgenic animals and their significance.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss the process and significance of transcription in prokaryotes and eukaryotes.

17. Explain the types of mutations and their molecular basis. How are mutations detected and analyzed?

18. Describe the tools and methods used in gene cloning, emphasizing different types of vectors.

19. Analyze the various techniques used in DNA sequencing, highlighting Sanger's method and automated sequencing.

20. Discuss the applications of genetic engineering in medicine, focusing on gene therapy and recombinant cytokines.

